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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,371	04/09/2004	Anders Landin	5181-25901	1212

58467 7590 03/10/2011

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EXAMINER	
PATEL, KAUSHIKKUMAR M	
ART UNIT	PAPER NUMBER
2186	

NOTIFICATION DATE	DELIVERY MODE
03/10/2011	ELECTRONIC

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ANDERS LANDIN, ROBERT E. CYPHER, and ERIK E. HAGERSTEN

Appeal 2009-005675
Application 10/821,371[1]
Technology Center 2100

Before LANCE LEONARD BARRY, JOSEPH L. DIXON, and JAY P. LUCAS, *Administrative Patent Judges*.

LUCAS, *Administrative Patent Judge*.

DECISION ON APPEAL[2]

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[1] Application filed April 09, 2004. The real party in interest is Sun Microsystems, Inc.

[2] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

STATEMENT OF THE CASE

Appellants appeal from a final rejection of claims 7 to 29 under authority of 35 U.S.C. § 134(a). Claims 1 to 6 and 30 are cancelled. The Board of Patent Appeals and Interferences (BPAI) has jurisdiction under 35 U.S.C. § 6(b).

We reverse.

Appellants' invention relates to a coherency protocol for maintaining coherency (the validity of stored data) in a multi-node computer system. In the words of Appellants:

> In certain situations or configurations, systems employing broadcast protocols may attain higher performance than comparable systems employing directory based protocols since coherence requests may be provided directly to all processors unconditionally without the indirection associated with directory protocols and without the overhead of sequencing invalidation and/or acknowledgment messages. However, since each coherence request must be broadcast to all other processors, the bandwidth associated with the network that interconnects the processors in a system employing a broadcast snooping protocol can quickly become a limiting factor in performance, particularly for systems that employ large numbers of processors or when a large number of coherence requests are transmitted during a short period. In such environments, systems employing directory protocols may attain overall higher performance due to lessened network traffic and the avoidance of network bandwidth bottlenecks.
>
> Thus, while the choice of whether to implement a shared memory multiprocessing system using a broadcast snooping protocol or a directory based protocol may be clear based upon certain assumptions regarding network traffic and

> bandwidth, these assumptions can often change based upon the utilization of the machine. This is particularly true in scalable systems in which the overall numbers of processors connected to the network can vary significantly depending upon the configuration.
>
> A system may include several nodes coupled by an inter-node network configured to convey coherency messages between the nodes. Each node may include several active devices coupled by an address network and a data network. The nodes implement a coherency protocol such that if an active device in one of the nodes has an ownership responsibility for a coherency unit, no active device in any of the other nodes has a valid access right to the coherency unit. For example, if a node receives a coherency message requesting read access to a coherency unit from another node, the node may respond by conveying a proxy address packet on the node's address network to an active device. Receipt of the proxy address packet may remove the active device's ownership responsibility for the coherency unit. In contrast, an active device within the node may request read access to a coherency unit by sending an address packet on the address network. Receipt of the address packet by an active device having an ownership responsibility for the coherency unit may not remove that device's ownership responsibility

(Spec. 4, 5; ¶¶ [0009], [0010] and [0011]).

The following illustrates the claims on appeal:

Claim 7:

> 7. A multi-node system, comprising:
>
> a node including a plurality of active devices and an interface coupled by an address network configured to convey

address packets between the interface and the plurality of active devices, and a data network configured to convey data packets between the interface and the plurality of active devices, wherein the address network and the data network are separate networks;

an inter-node network configured to convey coherency messages between the interface in the node and an additional interface in an additional node, wherein the additional interface is configured to send a coherency message requesting a read access right to a coherency unit on the inter-node network, wherein a given active device of the plurality of active devices has an ownership responsibility for the coherency unit;

wherein the interface is configured to respond to the coherency message by sending a proxy address packet on the address network;

wherein a different active device of the plurality of active devices is configured to request a read access right to another coherency unit by sending an address packet on the address network;

wherein the given active device of the plurality of active devices has an ownership responsibility for the another coherency unit, wherein the given active device is configured to not transition the ownership

responsibility for the another coherency unit in response to the address packet and to transition the ownership responsibility for the coherency unit in response to the proxy address packet.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Hagersten	US 5,940,860	Aug. 17, 1999
Rowlands (hereinafter "Rowlands 2")	US 2004/0034747 A1	Feb. 19, 2004
Chen	US 6,931,496 B2	Aug. 16, 2005
Rowlands (hereinafter "Rowlands 1")	US 6,948,035 B2	Sep. 20, 2005

REJECTIONS

The Examiner rejects the claims as follows:

R1: Claims 7 to 15, and 18 to 29 stand rejected under 35 U.S.C. § 103(a) for being obvious over Rowlands 1 and Rowlands 2 in view of Chen.

R2: Claims16 and 17 stand rejected under 35 U.S.C. § 103(a) for being obvious over Rowlands 1 and Rowlands 2 in view of Chen and Hagersten.

ISSUE

The issue is whether Appellants have shown that the Examiner erred in rejecting the claims under 35 U.S.C. § 103(a). The issue specifically turns on whether the cited references teach the claimed limitation of transitioning ownership responsibility for one coherency unit in response to a proxy address packet generated in response to a coherency message from across the inter-node network, but not transitioning ownership responsibility for a

coherency unit when receiving a address packet from an active device within the node.

FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence.

1. Appellants have invented a system and method for maintaining coherency of data in caches across a multi-node network (Spec. ¶¶ [0001], [0004]; App. Br. 6, middle). Each node comprises a number of active devices (App. Br. 6, top). Coherency is maintained by coherency units around the network, which may be "owned" by an active device within a node (Spec. ¶ [0090]). A "proxy address" generated in response to a coherency message from another node may release the ownership responsibility of an active device (App. Br. 6, top). But a simple address packet from an active device within the same node will not release the ownership responsibility of the active device owning a coherency unit (Spec. ¶ [0091], App. Br. 6, top).

2. The Rowlands 1 reference teaches a design for nodes within a multi-node system with agents in the node communicating with other nodes to maintain coherency (Col. 1, ll. 42). The nodes themselves, pictured in Fig. 1 as node #10, demonstrate read and transmit packets on separate read networks and transmit networks (Col. 3, l. 28). A memory bridge contains circuitry that handles internode coherency functions within a node.

3. Rowlands 2 and Chen teach distributed systems with multiple nodes and coherency systems maintaining the currency of stored data (Rowlands 2 and Chen, generally).

PRINCIPLES OF LAW

Appellants have the burden on appeal to the Board to demonstrate error in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of prima facie obviousness or by rebutting the prima facie case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

"In reviewing the [E]xaminer's decision on appeal, the Board must necessarily weigh all of the evidence and argument." *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

ANALYSIS

Arguments with respect to the rejection of claims 7 to 29 under 35 U.S.C. § 103(a) [R1, R2]

The Examiner has rejected the noted claims for being obvious over Rowlands 1, Rowlands 2 and Chen. Appellants have raised a number of issues, but the first issue we find to be dispositive of this appeal. Appellants

contend that the memory bridge 32, cited by the Examiner as the element in Rowlands 1 that controls the movement of the coherency commands, "does not initiate a different kind of command such as a "proxy packet" internally on the interconnect 22 in response to receiving a coherency command from another node via the interfaces 30." (App. Br. 12, bottom).

In reviewing (and mapping) the claims in detail, we find them to require that the active devices with a node have "ownership responsibility" of the coherency units. The claims clearly further require that an interface on the node generates a proxy address packet in response to a coherency message from another node, but a (plain) address packet is sent from a active device within the same node. The proxy address packet will effect a transition in the ownership responsibility for the coherency unit; the address packet will not transition the ownership responsibility for the coherency unit. (*See* claim 7, above).

Thus the claim distinguishes between the effect of a proxy address packet engendered by a coherency message from another node and an address packet generated in the same node. One transitions ownership for the coherency unit; the other does not.

In response, the Examiner has highlighted the coherency actions of Rowlands 1 recited in that patent, at column 5, lines 44 to 63 (Ans. 9, top). We find no distinction as recited by the claim in that citation, nor anywhere else in the patent. Nor do we find it in the other applied art.

We thus find that the Examiner has erred in the rejection of the claims, for failure of the reference to render obvious a claimed limitation.

The same issue as resolved above affects the second rejection R2 by obviating the teachings of Rowlands 1 as an effective reference. We thus find error in the rejection of all of Appellants' claims under both rejections.

CONCLUSIONS OF LAW

Based on the findings of facts and analysis above, we conclude that Appellants have shown that the Examiner erred in rejecting claims 7 to 29.

DECISION

We reverse the Examiner's rejections R1 and R2 of claims 7 to 29.

REVERSED

peb

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